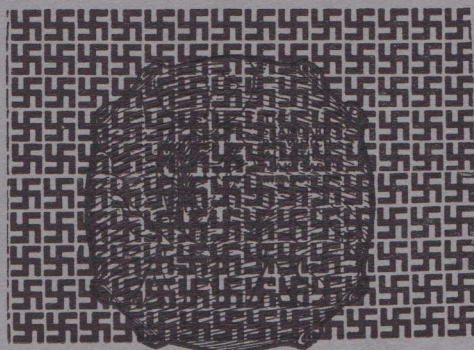


STUCCO

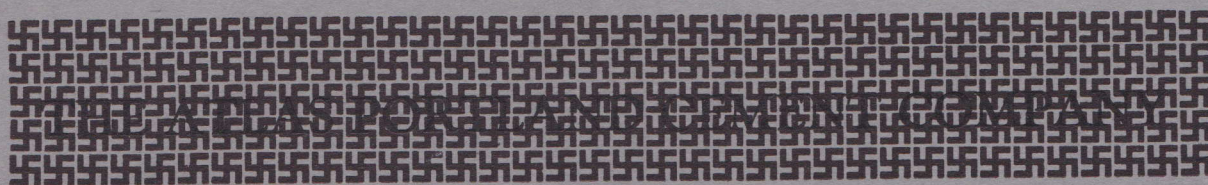
INTERIOR PLASTERING - GRAFFITO



Universal Atlas Cement Co.

Subsidiary of United States Steel Corporation

OFFICES: CHICAGO, NEW YORK, PHILADELPHIA, BOSTON, ALBANY, PITTSBURGH, CLEVELAND, COLUMBUS,
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ATLAS WHITE PORTLAND CEMENT

Pure white and with all the strength of gray Portland cement

FOR STUCCO INTERIOR PLASTERING - GRAFFITO

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Mellor, Meigs, & Howe, Architects



RIVERDALE, N. Y.

Julius Gregory, Architect

PORTLAND CEMENT STUCCO

PORTLAND cement stucco has, during the one hundred years of its use, thoroughly proved its ability to stand up under the extremes of climatic conditions. In the same manner that Portland cement forms the basis for the great structures of concrete, so it also forms the basis for the most permanent type of stucco.

Color is made possible by the use of white Portland cement. Color combined with texture in stucco gives it unlimited possibilities.

The information in this book on the application of stucco is largely based on the research work of the American Concrete Institute through its Committee on Concrete Surfaces. It combines the experience of the best stucco experts of this country with many years of experiment in connection with the United States Bureau of Standards.

GENERAL NOTES ON DESIGN

Design. As in all types of construction, there are methods and details to be followed to secure the best results. In general, they are to prevent water from entering the wall in back of stucco. It cannot go through the stucco, but careful attention should be given to flashing to prevent its entrance at other places.

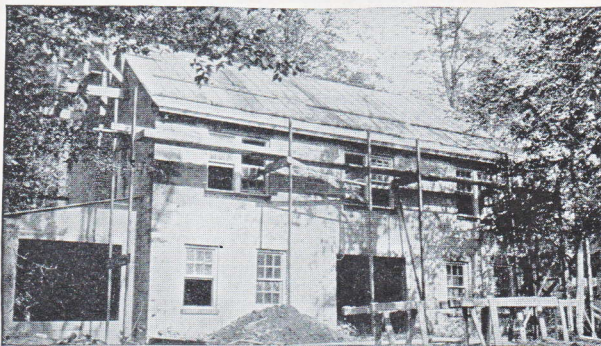
The design of the structure should be such that there is a projection of some nature, such as a slightly overhanging roof or similar projection to prevent the entrance of water at the top of the wall. Horizontal surfaces and copings and cornices, where water might collect and remain, should be avoided as in other types of construction. All exposed stucco surfaces should shed water quickly, and whenever departure from the vertical is necessary as at water tables, belt courses, and the like, the greatest slope possible should be given the stucco.

Do not run stucco to the ground on metal lath as capillary attraction will keep the stucco wet. Use for this purpose a backing of masonry, such as concrete, stone, brick or concrete block. Care is needed here to have the wall clean from dirt splashed on by the drip of the eaves, which would prevent good bonding of the different coats of stucco. Each coat should be cleaned in turn.

Flashing. Suitable flashing should be provided over all door and window openings wherever projecting wood trim occurs. Wall copings, cornices, rails, chimney caps, etc., should be built of masonry

or metal with ample overhanging drip groove of lip and water-tight joints. If copings are set in blocks with mortar joints, continuous flashing should extend across the wall below the coping, and project beyond and form an inconspicuous lip over the upper edge of the stucco. Continuous flashing with similar projecting lip should be provided under brick sills. This flashing should be so installed as to insure absolute protection against interior leakage. Cornices set with mortar joints should be provided with flashing over the top. Sills should project well from the face of the stucco and be provided with drip grooves or flashing, as described above for brick sills. Sills should also be provided with stools or jamb seats to insure wash of water over the face and not over the ends. Special attention should be given to the design of gutters and down spouts at returns of porch roofs where overflows will result in discoloration and cracking. A 2-in. strip should be provided at the intersection of walls and sloping roofs and flashing extended up and over it, the stucco being brought down only to the top of the strip.

Preparation of Original Surface. All roof gutters should be fixed, and downspout hangers and all other fixed supports should be put in place before the plastering is done, in order to avoid breaks in the stucco. Metal lath should be stopped not less than 12 in. above grade to be free from ground moisture. All trim should be placed in such manner that it will show its proper projection in relation to the finished stucco surface, particularly in over-coating.



The walls of concrete block complete.



Kenneth M. Dalzell, Architect
After the stucco has been applied.

PROPORTIONING, MIXING AND APPLYING THE STUCCO

For complete specifications see Pages 34 and 35

Mortar. The mortar should never be richer than 1 sack of Portland Cement to 3 cubic feet (3 sacks) of fine aggregate. (It is usually safe practice to use the same proportions for all coats and all work, that is, in the proportions of one sack of cement, 3 cubic feet of sand and 5 pounds of hydrated lime.) Hydrated lime must not be in excess of one-fifth the volume or 10% by weight of the cement.

All coats are preferably of the same mortar mixture, except that the finish coat can be leaner than the base coats, but the finish coat must never be richer than the base coats.

Hair or fibre should only be used for the first coat on metal lath. The function of hair is to prevent too much mortar from falling through the lath and is therefore only necessary on deeply furred lath or in back-plastered construction and should never be used on masonry.

Mixing. The importance of proper and thorough mixing of the ingredients of the mortar cannot be too strongly emphasized. Machine mixing is in all cases to be recommended in preference to hand mixing.

The ingredients of the mortar should be mixed until thoroughly distributed, and the mass is uniform in color and homogeneous. The quantity of water necessary for the desired consistency should be determined by trial, and thereafter measured in proper proportion.

Machine Mixing. The mortar should preferably be mixed in a suitable mortar mixing machine of the rotating drum type. The period of machine mixing should be not less than five minutes after all the ingredients are introduced into the mixer.

Hand Mixing. The mixing should be done in a watertight mortar box, and the ingredients should be mixed dry until the mass is uniform in color and homogeneous. The proper amount of water should then be added and the mixing continued until the consistency is uniform.

Measuring Proportions. Methods of measurement of the proportions of water should be used which will secure separate uniform measurements at all times. All proportions stated should be by volume. A bag of cement (94 lbs. net) may be assumed to contain 1 cubic foot; 40 lbs. may be assumed as the weight of 1 cubic foot of hydrated lime.

Hydrated lime should be measured dry, and should not be measured nor added to the mortar in the form of putty.

Note—A four quart pail or a box 6" square and 6" deep will hold 5 lbs. hydrated lime.

Retempering. Mortar which has begun to stiffen or take on its initial set should not be used.

Note—For table of quantities see Page 13.

Consistency. Only sufficient water should be used to produce a good workable consistency. The less water, the better the quality of the mortar within working limits.

Applying the Stucco. The base coat and second coat should both be *thoroughly scratched*. The practice of giving the second coat a float finish to receive the finish coat is wrong.

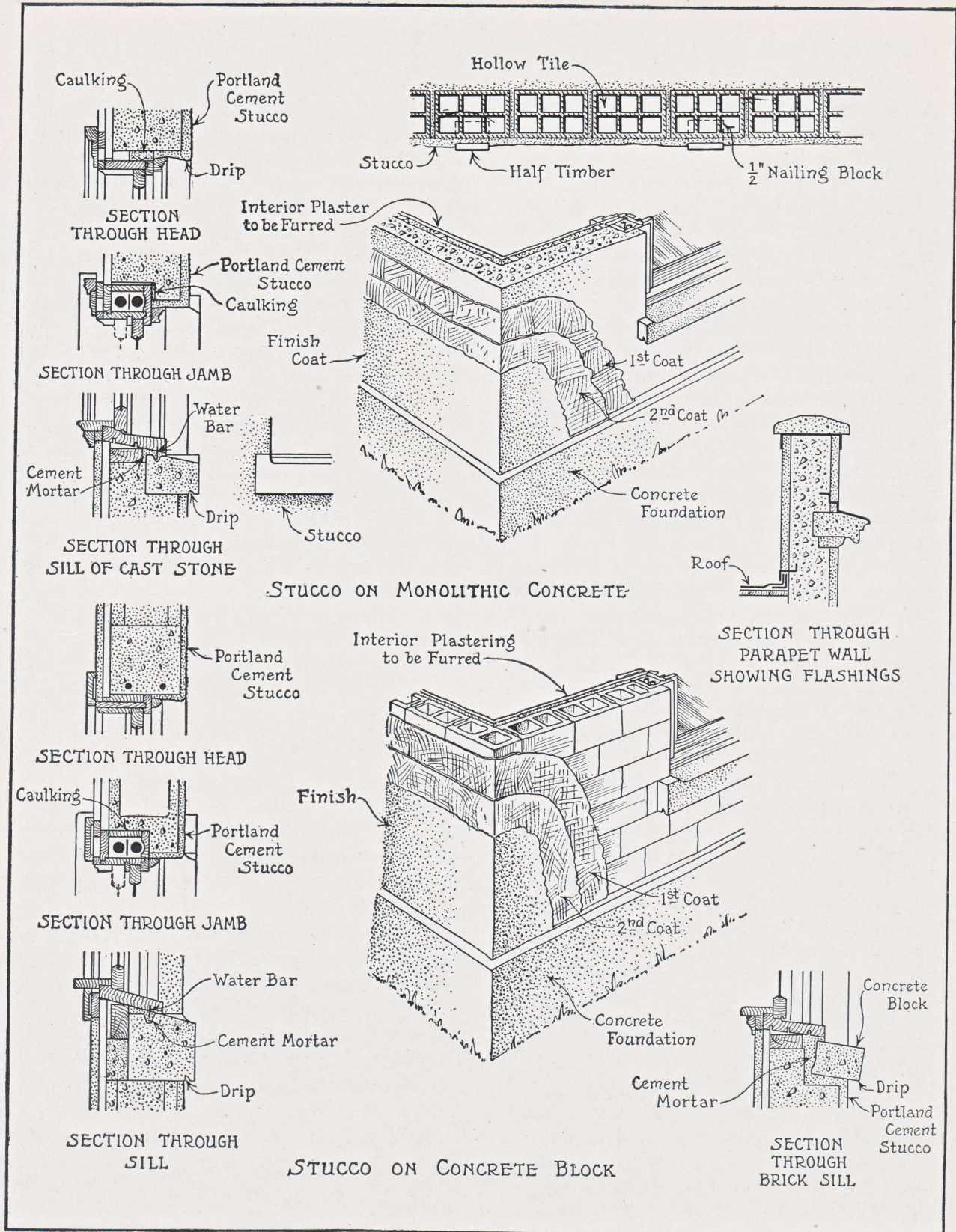
Apply the second coat the day after the base coat, if possible. Then wait at least one week before applying the finish coat. It is even better to wait longer than a week if possible and no harm is done if the time between the second coat and the finish coat is as long as several months.

The object of this time interval is to allow the building to adjust itself to the added weight caused by the stucco, particularly in the case of frame buildings.

Wet each coat thoroughly before applying the next coat.

The stucco should not be allowed to dry out too rapidly and adequate precaution should be taken to prevent this, either by frequent sprinkling after the mortar has set hard enough to permit it, or by hanging wet burlap or similar material over the surface.

Stucco should never be applied when the temperature is below 32 degrees F. or when there is any likelihood that it will drop below this point during the succeeding 48 hours. Stucco should not be applied when conditions are such that ice or frost may form on the surface of the wall. Periods of mild weather are frequent during the winter when weather conditions will allow base coats to be safely applied. If slight frost damage should occur, the injured portion can be removed and patching resorted to. This is not a serious detriment to the under coats. It is wisest to allow the finish coat to wait until there is assurance of warm weather.



STUCCO ON MASONRY WALLS

STUCCO ON MASONRY WALLS

For Complete Specification See Page 34

Poured Concrete. Stucco is applied directly to poured concrete walls. They should first be prepared by thoroughly roughening the surface. This can be done by scrubbing with a very stiff wire brush when the concrete is less than twenty-four hours old or by hacking the surface with a stone hammer or chisel. This means exposing a clean fresh surface and not just making widely separated hack marks in the surface. (There are also patented materials on the market which will prepare the surface for stucco.)

This preparation of the surface is necessary as all poured concrete has a layer of laitance or dead material on the surface that will ordinarily kill the bond. Do not use a bonding material. None is needed.

Wet down the concrete before applying the stucco.

Two coats are sufficient; the base coat to even up the surface, and then the finish coat.

Concrete Block. Dry tamp block need no preparation except to wet down the wall before applying the stucco. The suction will draw the mortar into the pores of the block and give a perfect bond. Do not cover the exterior of the block with a bonding material as none is needed and it will prevent a bond instead of giving one.

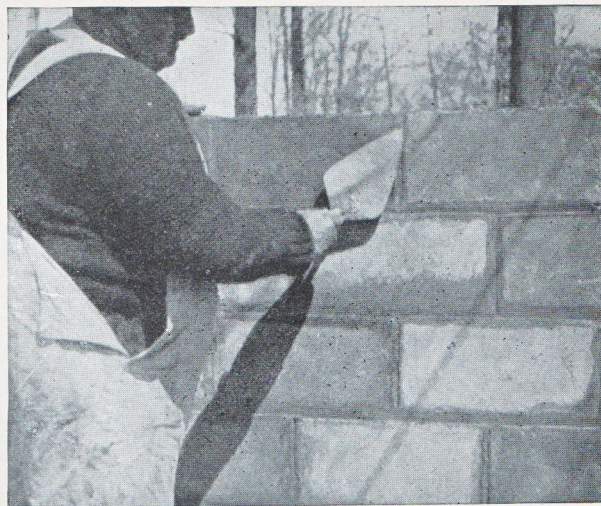
Wet poured block must have a rough clean surface on which to apply the stucco. This is best accomplished by roughening the face of the block while they are still in the moulds and partially set. If they have hardened, the smooth surface must be removed by hacking or cutting with a chisel until an entirely rough surface is given.

Always use three coats on block to prevent the joints from showing through.

Brick. Portland cement stucco will bond directly to the wall if made of ordinary common brick as long as the surface is clean, as is common in ordinary work. Joints may be raked out but it is not necessary. Apply the stucco directly to the brick in three coats.

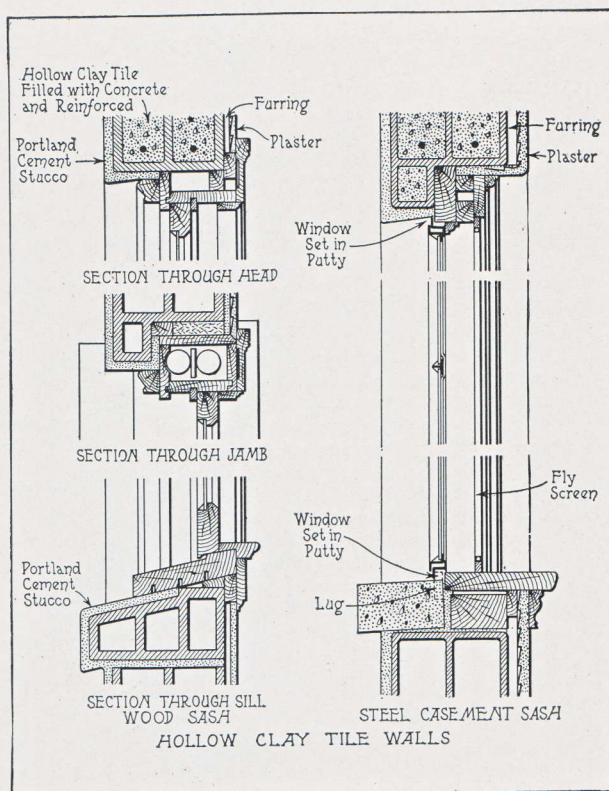
Hollow Clay Tile. Always apply the stucco in three coats to a minimum total thickness of $\frac{7}{8}$ of an inch. Always apply the stucco directly to the tile, and never use any waterproofing or bonding material as it will quite invariably cause failure.

Wet down the wall thoroughly before applying the base coat to prevent excessive absorption.

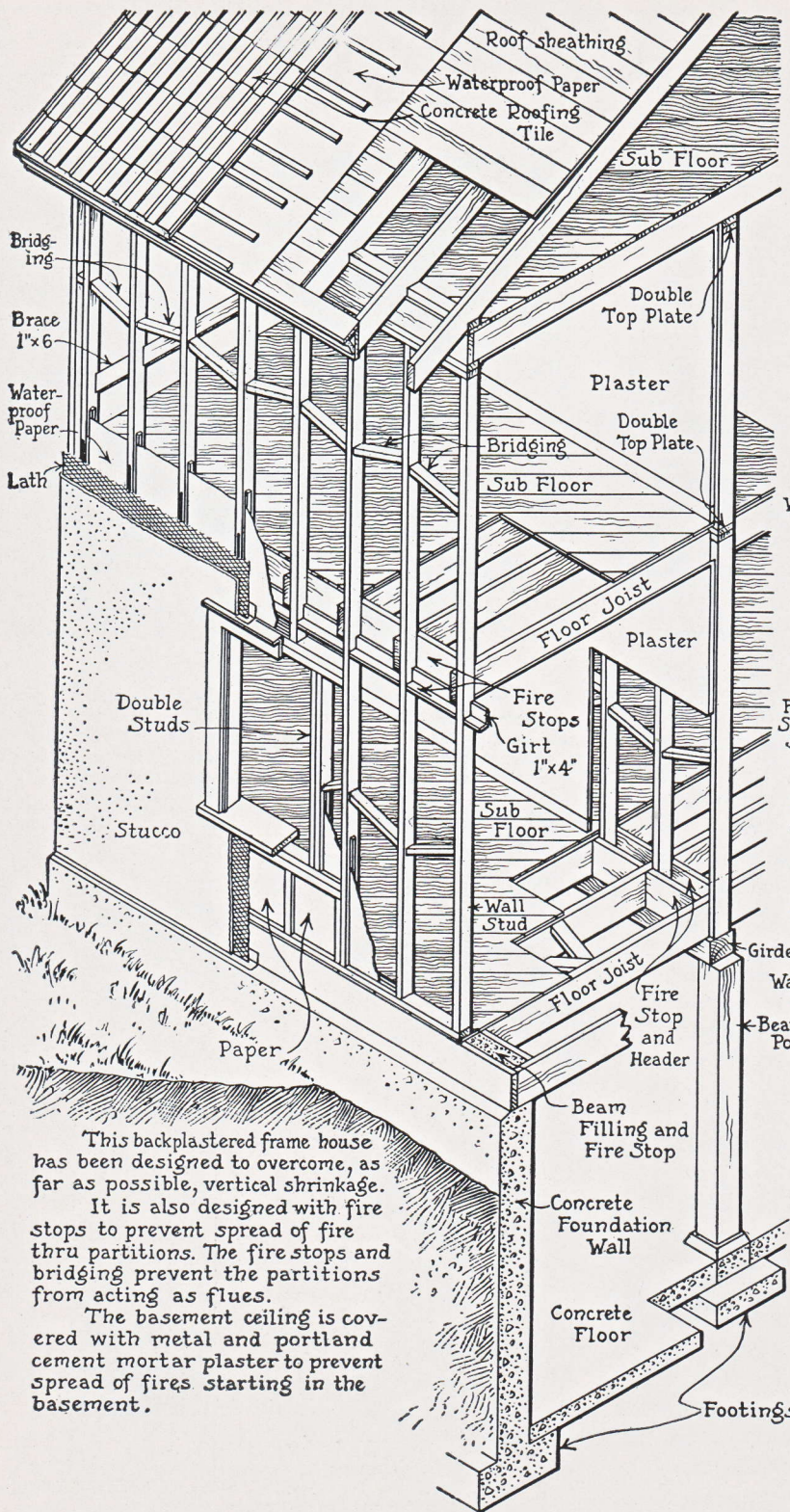


THE WALL OF CONCRETE BLOCK

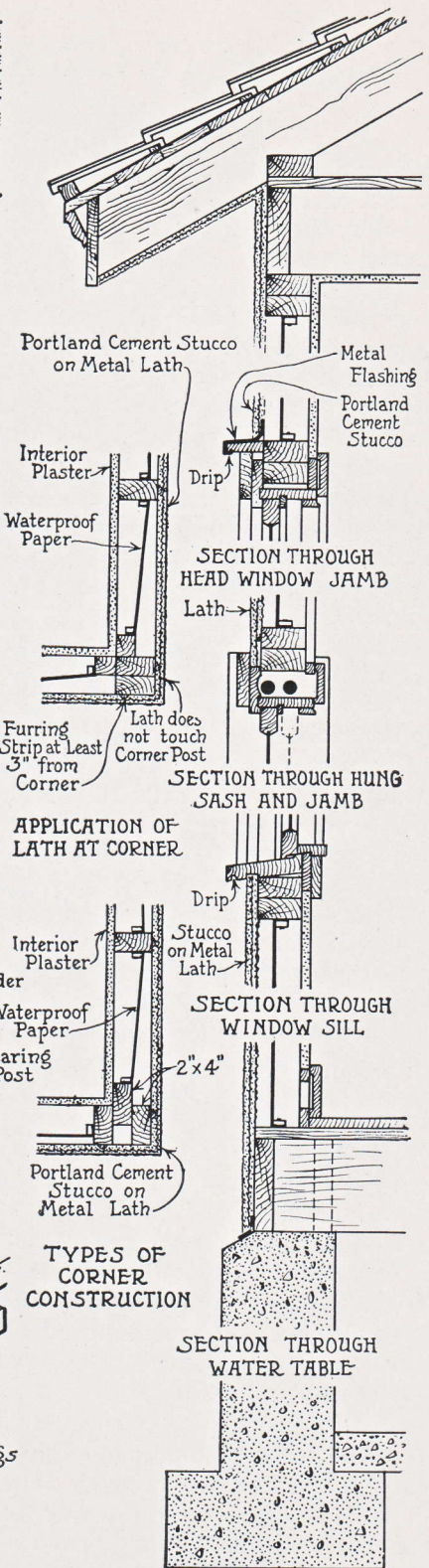
Concrete units are composed of Portland cement giving practically the same composition as stucco. They may be laid quickly and form a most perfect backing for Portland cement stucco. Concrete block are sufficiently small in size to allow for flexibility in design of the house.



Details of Wood Sash and Steel Sash



This backplastered frame house has been designed to overcome, as far as possible, vertical shrinkage. It is also designed with fire stops to prevent spread of fire thru partitions. The fire stops and bridging prevent the partitions from acting as flues. The basement ceiling is covered with metal and portland cement mortar plaster to prevent spread of fires starting in the basement.



STUCCO-BACK PLASTERED

STUCCO BACK-PLASTERED OR WITHOUT SHEATHING

For Complete Specifications See Page 34

This type of construction affords satisfactory insulation, and at the same time eliminates the possibility of cracking due to the sheathing, and gives the lath the best protection against corrosion because it is so thoroughly imbedded.

Framing. Studs spaced not to exceed 16 inch centers should be run from foundation to rafters without any intervening horizontal members. The studs should be tied together just below the floor joists with 1 x 6 inch boards which should be let into the studs on their inner side, so as to be flush and securely nailed to them. These boards will also act as sills for the floor joists, which, in addition, should be securely spiked to the side of the studs. The corners of each wall should be braced diagonally with 1 x 6 inch boards let into the studs on their inner side, and securely nailed to them.

Bridging between the studs at least once in each story height is recommended. The bridging should be of the same size as the studs (usually 2 x 4 inch). It should be placed horizontally, and 1 inch back of the face of the studs, in order that the back-plaster coat may be carried past the bridging without break at this point. Diagonal bracing at the corners of each wall is recommended, especially, when sheathing is omitted. Such bracing may be of 1 x 6 inch boards, 6 or 8 feet long, let into the studs on their inner side in order not to interfere with the back-plastering or the interior plastering. The length of the corner bracing will, of course, depend to some extent on the location of window or other openings.

Furring. In back-plastered construction, galvanized or painted $\frac{3}{8}$ inch crimped furring, not lighter than 22-gauge or other shape giving equal results, should be fastened direct to the studding, using $1\frac{1}{4}$ inch x 14-gauge staples, spaced 12 inches apart, or wood furring may be used.

Lath. Metal lath should be galvanized or painted expanded lath weighing not less than 3.4 lbs. per square yard.

Wire lath should be galvanized or painted woven wire lath, not lighter than 19-gauge, $2\frac{1}{2}$ meshes to the inch, with stiffeners at 8-inch centers.

Application of Lath. Lath should be placed horizontally, driving galvanized staples $1\frac{1}{4}$ inch x 14-gauge not more than 8 inches apart over the furring or stiffeners. Vertical laps should occur

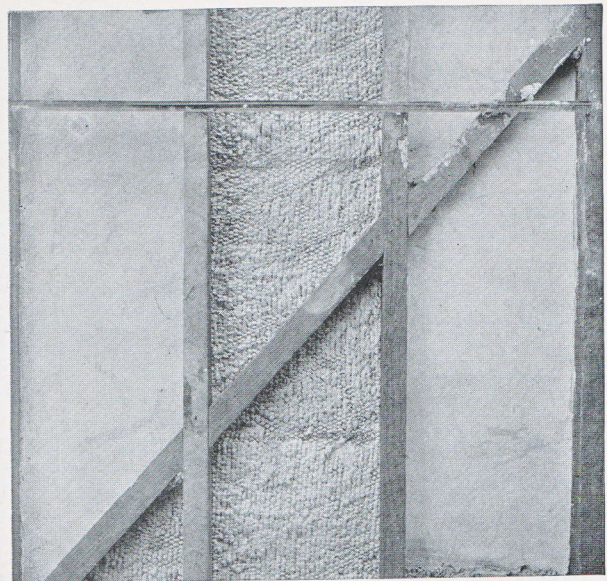
at supports and should be fastened with staples not more than 4 inches apart. Horizontal joints should be locked or butted and tightly laced with 18-gauge galvanized wire.

Corners. The sheets of metal lath should be folded around the corners a distance of at least 3 inches and stapled down as applied. The use of corner bead is not recommended.

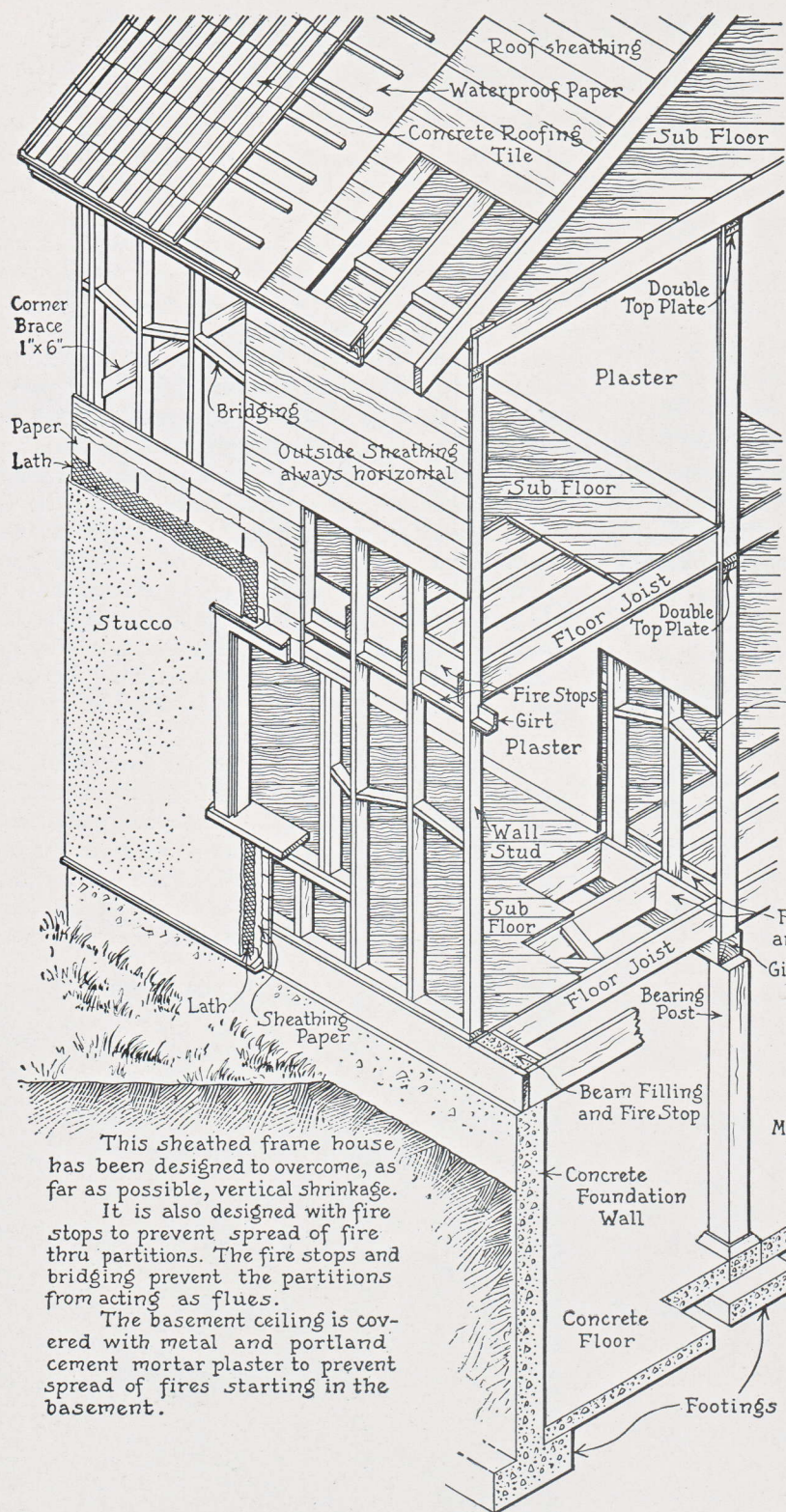
Insulation. The air space in back-plastered walls may be divided by applying building paper, quilting, felt, or other suitable insulating material between the studs, and fastening it to the studs and bridging by nailing wood strips over folded edges of the material. This insulation should be so fastened as to leave about 1 inch air space between it and the stucco. Care should be taken to keep the insulating material clear of the stucco, and to make tight joints against the wood framing at the top and bottom of the space and against the bridging.

Another method is to loop the paper between the studs, allowing it to curve in until it is about $\frac{3}{4}$ of an inch from the stucco.

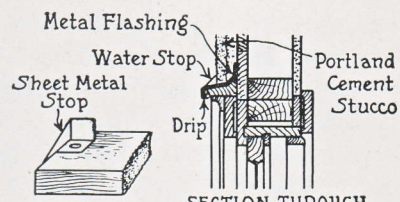
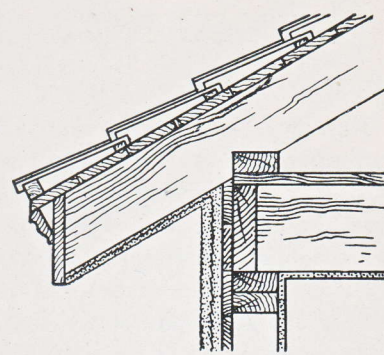
Application of Coats. After the base coat has hardened sufficiently, the mason applies a coat of stucco between the studs from the inside, completely imbedding the lath. Then the second coat is applied on the outside, and not less than a week later the finish coat, making a total thickness from the face of the studs of about $1\frac{1}{4}$ inches.



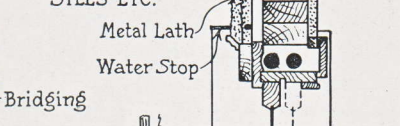
Interior view of back-plastered construction before applying insulation. Center panel has not received back-plastering.



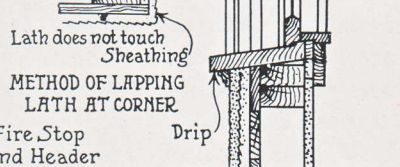
This sheathed frame house has been designed to overcome, as far as possible, vertical shrinkage. It is also designed with fire stops to prevent spread of fire thru partitions. The fire stops and bridging prevent the partitions from acting as flues. The basement ceiling is covered with metal and portland cement mortar plaster to prevent spread of fires starting in the basement.



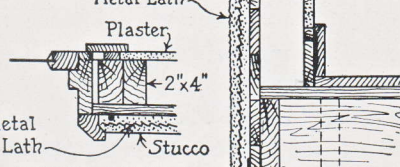
SECTION THROUGH HEAD WINDOW JAMB



SECTION THROUGH HUNG SASH AND JAMB



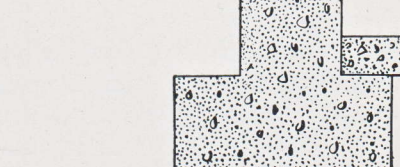
METHOD OF LAPPING LATH AT CORNER



SECTION THROUGH WINDOW SILL



SECTION THROUGH DOOR JAMB



SECTION THROUGH WATER TABLE

STUCCO OVER SHEATHED FRAME

STUCCO ON SHEATHED FRAME CONSTRUCTION

STUCCO ON METAL LATH OVER SHEATHING

For Complete Specifications See Page 34

This is the most common method of applying stucco over frame construction. It should be thoroughly compared to the type known as "back-plastered" shown on the next page, as this latter type eliminates the possibility of cracking due to the warping of the sheathing, and tests show that sheathing is responsible for most of the cracking.

Framing. Studs spaced not to exceed 16 inch centers should be run from foundation to rafters without any intervening horizontal members. The studs should be tied together just below the floor joists with 1 x 6 inch boards which should be let into the studs on their inner side, so as to be flush and securely nailed to them. These boards will also act as sills for the floor joists, which, in addition, should be securely spiked to the side of the studs. The corners of each wall should be braced diagonally with 1 x 6 inch boards let into the studs on their inner side, and securely nailed to them.

Sheathing. The sheathing boards should not be less than 6 inches nor more than 8 inches wide, dressed on one or both sides to a uniform thickness of $\frac{7}{8}$ of an inch. They should be laid horizontally across the wall studs and fastened with not less than two 8d nails at each stud. When sheathing is used, it should be laid horizontally and not diagonally across the studs. The stucco test panels erected at the Bureau of Standards in 1915 and 1916 have demonstrated conclusively that diagonal sheathing tends to crack the overlying stucco by setting up strains in the supporting frame.

Lath. It is extremely difficult to secure satisfactory results with Portland cement stucco on wood lath although in some parts of this country, particularly those where the temperature seldom varies and rarely reaches freezing, it has been used with fair success. Satisfactory results are far more easily secured on metal lath. The cost of metal lath is but slightly more than that of wood lath and the construction is undoubtedly better. The function of lath is to provide uniform reinforcement for the stucco. Lath is not just a roughness on which to hang the stucco. To protect the lath from corrosion, it must be thoroughly imbedded in the stucco. To prevent cracking, the laps must be thoroughly tied

so as to act as a uniform sheet over the entire building. Metal lath should be galvanized or painted expanded lath, weighing not less than 3.4 lbs. per square yard.

Wire lath should be galvanized or painted woven wire lath, not lighter than 19-gauge, $2\frac{1}{2}$ meshes to the inch, with stiffeners at 8-inch centers.

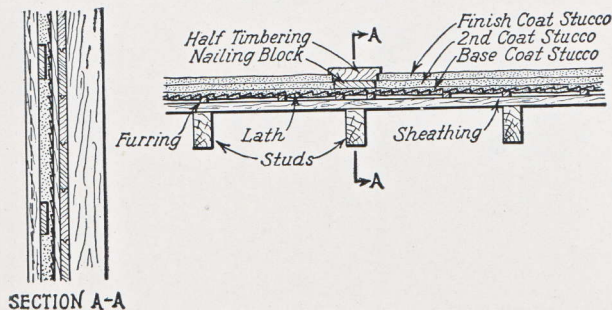
Application of Lath. Lath should be placed horizontally, driving galvanized staples $1\frac{1}{4}$ inch x 14-gauge not more than 8 inches apart over the furring or stiffeners. Vertical laps should occur at supports and should be fastened with staples not more than 4 inches apart. Horizontal joints should be locked or butted and tightly laced with 18-gauge galvanized wire.

Corners. The sheets of metal lath should be folded around the corners a distance of at least 3 inches and stapled down as applied. The use of corner bead is not recommended.

Furring. Furring should be galvanized or painted $\frac{3}{8}$ inch crimped furring not lighter than 22-gauge, or other shape giving equal results, should be fastened over the sheathing paper and directly along the line of the studs using $1\frac{1}{4}$ inch x 14-gauge staples, spaced 12 inches apart. The same depth of furring should be adhered to around curved surfaces, and furring should be placed not less than $1\frac{1}{2}$ inches nor more than 4 inches on each side of and above and below all openings. Wood furring may also be used. If self-furring lath is used, then the separate furring can be omitted.

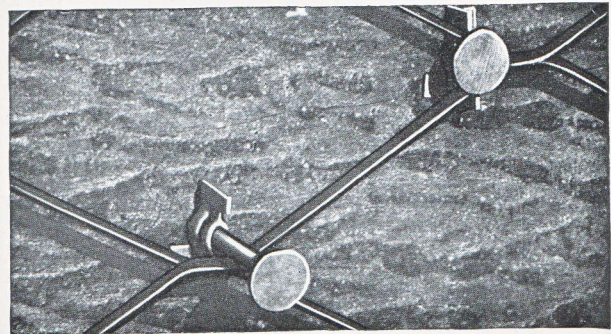
Coats. The stucco is then applied in three coats. The base and second coats should both be thoroughly scratched. The second coat can be applied over the base as early as the succeeding day, but it is best not to put the finish coat on for at least a week. The total thickness of the stucco is at least one inch, from the outside face of the lath.

Hair. Use hair or fibre only in the first coat and only in sufficient quantity to prevent the mortar from dropping down back of the lath. Too much hair will prevent the lath being imbedded thoroughly in the stucco, and it should not be used unless the furring is more than $\frac{3}{8}$ of an inch thick.

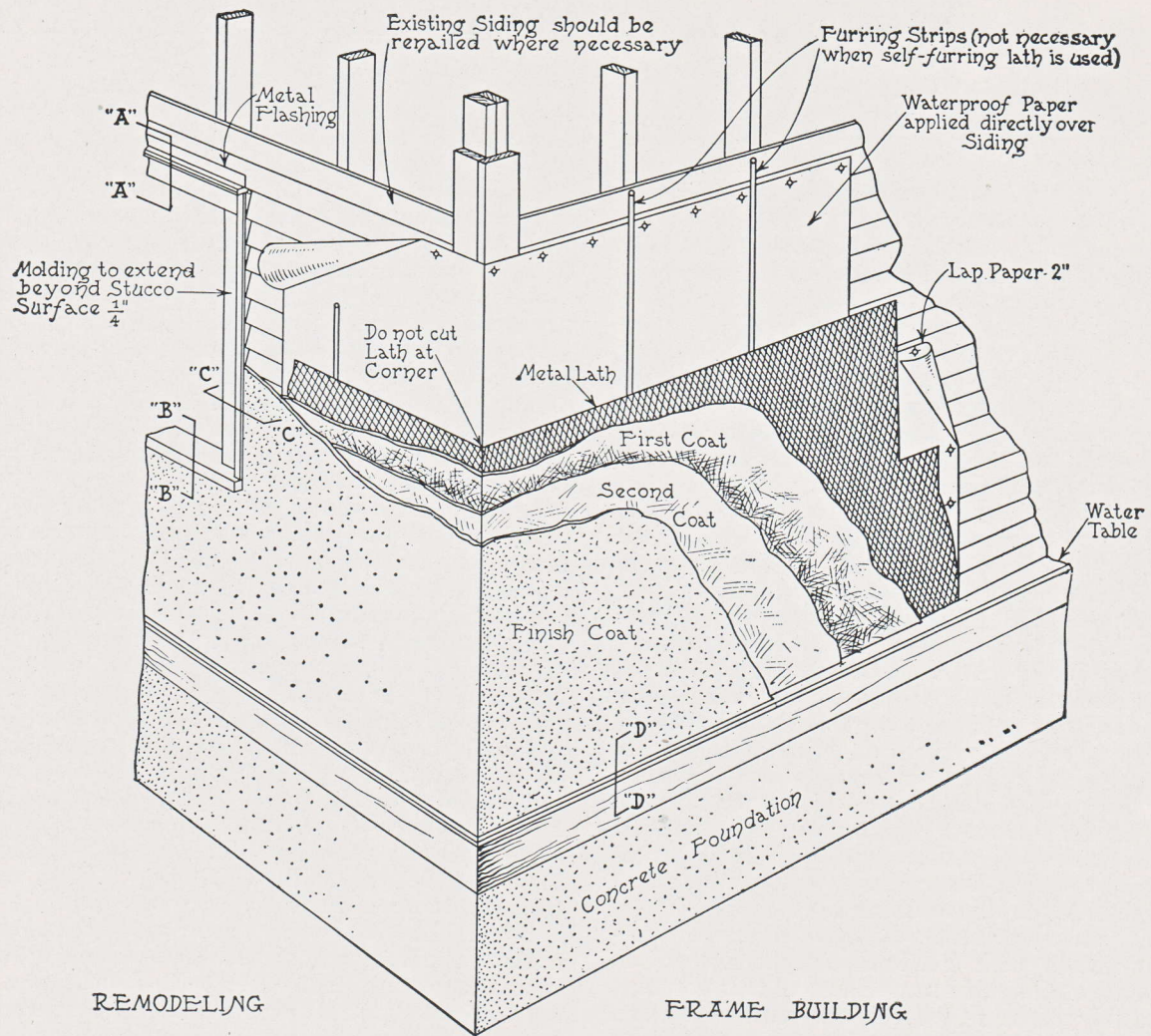


SECTION A-A

A method of attaching half-timbering.

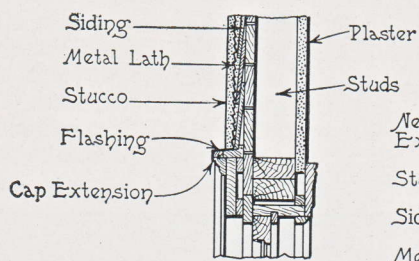


A furring nail that replaces the ordinary furring strip.

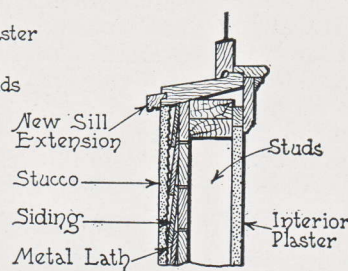


REMODELING

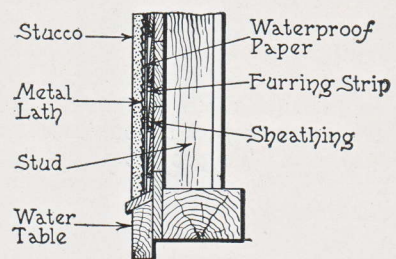
FRAME BUILDING



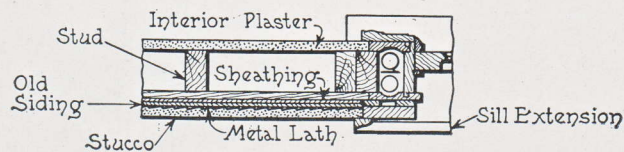
SECTION "A-A"



SECTION "B-B"



SECTION "D-D"



SECTION "C-C"

STUCCO OVER OLD FRAME CONSTRUCTION

REMODELING WITH STUCCO

Over Old Frame Buildings

In remodeling in stucco, the essential point to determine first is whether the frame work of the building is in good condition. It must be firm and strong in order that it will stand the weight of the stucco without cracking. The stucco coat will be an added weight and this must be taken into consideration.

If the frame work is in good condition, the rest of the work is comparatively simple and proceeds very much as outlined in the instructions under sheathed frame walls, and as shown in the cut on page 10.

If the siding is in poor condition, it is best removed and the work then proceeds as usual. If the

siding is in good condition, it is best left in place as it adds to the strength of the walls. First go over the building and see that all loose siding is securely nailed. If the siding consists of shingles or clapboards, the furring is often dispensed with. If the siding presents a smooth surface, furring should be used.

The main features then demanding attention are the door or window openings. Due to the extra thickness of the stucco, these must be given special treatment. In general, the trim around the windows is either extended, with proper flashing, or else the stucco is brought into the window openings with a return.

Over Old Brick or Stone

Overcoating Old Brick Walls—In stuccoing over old brick walls, it is necessary to have a clean surface to give a proper bond. When the stucco touches the wall, part of the cement is absorbed into the pores of the brick. If the wall is dirty or painted the suction is killed, and the dirt or paint forms a layer that kills the bond.

An ordinary common brick wall that has not been painted can often be cleaned by wire brushing and washing. Sand blasting can be used or the wall cleaned off by washing with a dilute solution of muriatic acid. If acid is used all trace of it must be removed by copious washing.

If these simple methods are not sufficient, the

old surface of the brick must be removed. This is done by a chisel and hammer, or a sharp pointed stone hammer, or by pneumatic or electric chipping chisels at a reasonable cost. Note carefully the photographs below. After the surface has been prepared, proceed as noted under brick walls on Page 7.

If the brick are very hard and have little or no suction, or if there is much dense stone trim, the whole building can be covered with metal lath and the work proceed as usual.

The softer, more absorbent stones can be stuccoed directly after preparing the surface in the same manner as the brick.



The proper method of preparing old brick for stucco. A new surface has been exposed by hacking.



As was to be expected the stucco came off this wall. Stucco will not bond to paint.

QUANTITIES OF MATERIAL REQUIRED

Note—In figuring quantities, do not deduct for window openings as this will allow for ordinary waste. Figure $\frac{1}{4}$ inch thick of mortar behind the lath for sheath work and $\frac{1}{2}$ inch for back-plastered stucco. Mix 1 part Portland cement and 3 parts of sand.

One Barrel of Cement is Required for Each	One Yard of Sand Is Required for Each
60 sq. yds. $\frac{1}{4}$ " thick	135 sq. yds. $\frac{1}{4}$ " thick
40 sq. yds. $\frac{3}{8}$ " thick	90 sq. yds. $\frac{3}{8}$ " thick
30 sq. yds. $\frac{1}{2}$ " thick	65 sq. yds. $\frac{1}{2}$ " thick
20 sq. yds. $\frac{3}{4}$ " thick	45 sq. yds. $\frac{3}{4}$ " thick
15 sq. yds. 1" thick	35 sq. yds. 1" thick
One bag of hydrated lime for each 8 bags of cement.	
One bag (100 lbs.) rock dash will cover 8 square yards.	

COLORING STUCCO

White Portland cement gives a neutral color base from which to secure various colors. As in all color work it is necessary to start with a pure white base.

So in stucco work, white Atlas Portland Cement is used for the finish coat where color is wanted. White and gray Portland cement are identical except for their difference in color. White Portland Cement is in every way as strong and lasting as gray.

The effect of using white Portland cement is to make possible all shades of color and secure them in clean, true shades. It is no more possible to secure proper color in stucco with gray Portland cement than it would be to try to get good colors in paint by adding pigments to a gray paint.

Nor does the use of Atlas White Portland Cement mean that only a pure white finish is possible. Such an effect is rarely wanted though it can be secured by using Atlas White Portland Cement and white aggregate such as crushed white marble. (Under no conditions use powdered marble.) Atlas White constitutes a neutral white base for color either by the addition of colored sands or pigments, or by a combination of both.

Coloring with Sand. Often a combination of ordinary building sand and white Portland cement gives a very attractive color in itself. This is particularly true of the yellow and brown sands that are very common in many parts of the country. With white Portland cement they produce attractive shades of cream and buff. If these colors are not deep enough they can be strengthened by the addition of pigment.

It is well to try out the local sand to see what effect and color it will give.

"Exposed aggregate stucco" is a name given to stucco in which the surface is treated by brushing, acid washing or chemically spraying so as to remove the surface film of water and expose the sand and stone chips of which the stucco is composed. In this type of stucco the finish coat is made of a mixture of Atlas White Portland Cement, sand and stone chips of good color—the stone chips being about three-eighths of an inch in size. The finish coat is troweled smooth, and when partially set is treated to expose the aggregate.

If desired, Portland cement stucco can be rock dashed with the assurance that the dash will remain permanently imbedded. The dash is thrown onto a base of pure white mortar so as to bring out the color of the dash.

Coloring with Pigments. Pigments can be used alone to give color, by employing them with a white

or light colored mortar such as is secured with white Portland cement and a white or light colored sand. Pigments also may be added to combinations of colored sands and white Portland cement for the purpose of intensifying the shade or for introducing another color tone.

For example, white Portland cement, yellow sand and a touch of red pigment gives a salmon pink effect. Countless effects can be secured by varying the pigments in quantity and in their combinations with different colored sands.

Deep colors are rarely desired in stucco, so that the amount of pigment used is rarely sufficient to lower the strength of the mortar. Light shades require about 2 to 4 pounds of color to a bag of cement. Medium shades from 4 to 6 pounds and up to about 8 pounds for the deepest shades. Never use more than 10 pounds or there is danger of lowering the strength of the mortar.

Pigments should always be those made for use with Portland cement. If in doubt of the proper place to secure them, write us.

In mixing pigment it is essential to mix thoroughly. A good method is as follows, when mixing by hand: Screen the white Portland cement and the pigment together through a screen about the size of fly screening until the cement is uniformly colored. Then mix the cement, sand and lime together dry until the color is uniform. Then add the water which should be carefully measured. Variations in the amount of water will cause different shades in the stucco. If a machine is used for mixing, the mixing process should be continued at least 5 minutes or until the color is uniform. Stucco samples should be allowed to dry for at least 10 days so that they will reach the final color, since moisture in the stucco gives a darker shade.

Premixed Portland Cement Stucco. Premixed stucco is stucco in which the cement, sand, coloring pigments, and other ingredients are mixed dry by the manufacturers, and merely the water is added at the work. Premixed or ready mixed Portland cement stucco is made in many color shades and by many manufacturers. Premixed stucco helps to eliminate uncertainty in securing a particular color shade. It is of great advantage in localities where it is impossible to obtain the desired shade with the available local sands, or where the local sand is not satisfactory for stucco. The names of manufacturers of premixed or ready mixed Portland cement stucco will be gladly furnished.

TEXTURE IN STUCCO

All stucco finishes possess some degree or variety of texture. Stipple, spatter dash, and sand float finishes are in themselves types of textures. For a long period these were the only textures used, for during that time the demand was for the perfectly uniform execution of such surface finishes. The monotony of these textures and the limitation of finishes to one of perhaps three or four varieties led to the introduction of the more varied and irregular textures of which there are a countless number.

Texture in stucco is best defined as a surface which shows the method used in applying the finish coat. Instead of a mechanical, uniform, and perfect surface, the marks of the tool are allowed to show the way in which the material was applied. The most attractive textures are those which result from the method of applying the material, rather than by applying a soft coat of mortar and then scraping or scratching it to make it look rough and to simulate the tool marks. Textures which are obtained easily and naturally will be found most attractive.

Some of the effects desired are those caused by the action of time in eroding and softening of the sharp edges. To secure such effects great care and skill must be exercised so that the result will not look forced and unnatural.

The more the simple tools of the trade are used, the better the results. A steel trowel, preferably an old one with rounded edges, a wood float, a bundle of twigs and a burlap bag or a brush will be sufficient. Special scrapers and tools invariably show their marks in the completed work and should not be used.

In the pages that follow are shown details of various textures and the method used in applying the stucco to secure them. They cover the main types or tendencies in textures and show how in general to secure these effects.

The number and variety of textures is unlimited. It is practically impossible to duplicate a texture exactly. The variation in the characteristics of the mortar and slight variations in the suction of the stucco base, will prevent monotony or too close imitation.

There is a relationship between the architecture of a building and the texture of the stucco. In the Southwest the old adobe stucco was usually applied by hand and smoothed to a fairly uniform surface and this is approximated with an irregularly applied finish, rubbed down.

In other localities the stucco was applied with rough tools and this effect is approximated by what might be called "free hand work."

The scale of the texture should be in keeping with the detail of the house and the distance from which it is normally viewed. The texture should not be too rough to be out of keeping with finely modeled details, yet at the same time it should not be so fine as to lose its character as stucco when viewed from a distance.

General Notes on Applying Textures. On the pages which follow there are brief descriptions of each method for securing the texture shown. In addition, certain precautions must be observed which apply to all textures. These general precautions are as follows:

All textures are secured in the finish coat alone. The second coat should be brought to a fairly even surface and should be thoroughly scratched. The base coats must be thoroughly saturated before applying the finish textural coat. Saturation does not consist of merely a sprinkling, but calls for a thorough drenching with a stream of water applied at least twice on the pervious day, with a sprinkling just before beginning work.

The thorough wetting will kill most of the suction and still leave sufficient suction to hold the finish coat without causing an immediate stiffening of the mortar, such as would occur if the wall were dry. The suction should be so reduced as to allow the finish coat to remain perfectly soft for at least one hour. This allows sufficient time to apply a lift and start on the next below. It allows the fresh mortar of the second lift to be worked into the still soft mortar of the first lift. In this way lift lines can be eliminated.

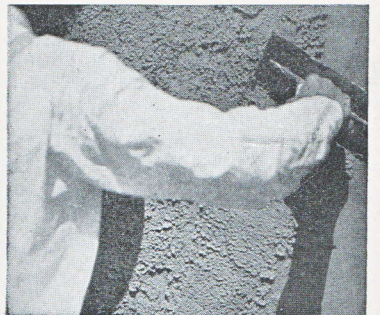
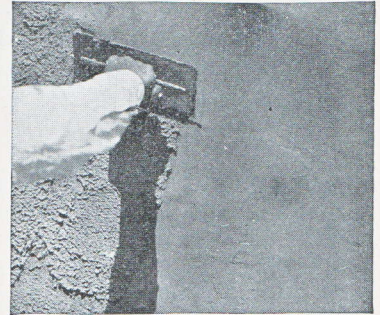
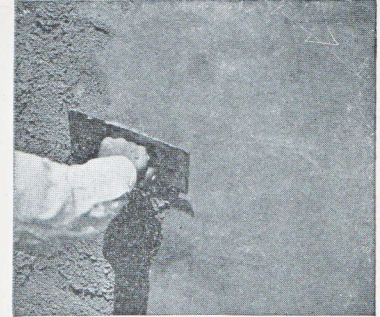
Most textures are applied with a rather free and quick motion and hence, a spot here and there is likely to be left uncovered. This would leave a portion of the differently-colored undercoat showing through and an attempt to cover it might damage the texture. For this reason, it is most convenient to apply the finish coat in two operations—first applying a very thin layer of the finishing mortar and immediately covering this with a textural finish. Then if a spot is left uncovered in the texture, the thin cover coat of the same color prevents it from being apparent.

Each batch of stucco should have exactly the same quantity of water used for mixing. This insures a uniform consistency for the mortar and prevents variation in both texture and color.



RIVERDALE, N. Y.

Julius Gregory, *Architect*



TEXTURE NO. 1

THIS torn texture is of great beauty, particularly when there is a play of light and shadow on the surface from leaves and foliage. The roughness of the texture also introduces lights and shades.

A thin cover coat of finish coat mix is trowelled onto a thoroughly wet down base, and while this is still soft, the actual finish coat is applied. The trowel is held at a sharp angle so that the mortar is torn. The material is worked in all directions with a rather short stroke of about a foot or so. Care is taken to leave no marks from the edge of the trowel.



SCARSDALE, N. Y.

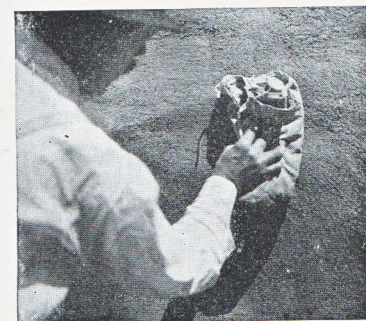
A. J. Thomas, *Architect*



TEXTURE NO. 2

THIS finish gives the effect of hand-worked stucco, an effect found in the Spanish adobe stucco of the Southwest.

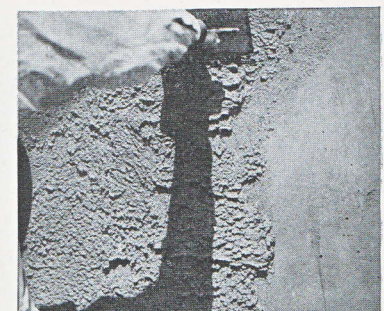
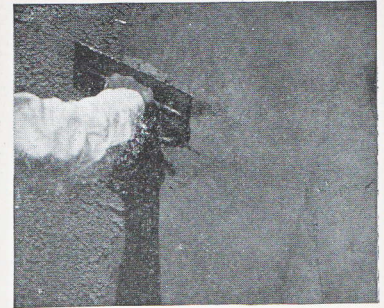
The effect is secured by the manipulation of the finish coat only. The finish coat is applied in irregular thickness, but the variations in the thickness should not be more than one-eighth inch, or a quarter inch at the maximum. Care must be taken to see that they average horizontal, as the mason will usually give them a slight pitch to the right. Their size should correspond roughly to the size of the projection of a one-man stone. Major irregularities should be roughly worked out with the trowel, and after setting for an hour or so, the surface should be vigorously rubbed with a burlap bag.





RIVERDALE, N. Y.

Julius Gregory, *Architect*



TEXTURE NO. 3

THIS texture, somewhat similar to that shown on Page 17, but of a larger scale, is applied in much the same way. Over a thoroughly wet down base, a thin cover coat of the finish coat mix is applied and while this is still soft the actual finish goes on. A trowel full of mortar is taken and applied with a quick, broad stroke, holding the trowel at a sharp angle, so that the surface is torn. The mix must be thoroughly plastic and fairly wet. The direction of the trowel is also varied so that texture does not give the impression of all being applied in one direction.



PELHAM, N. Y.

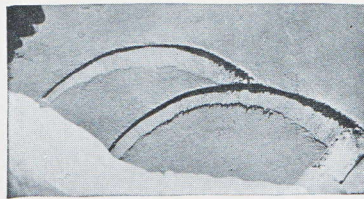
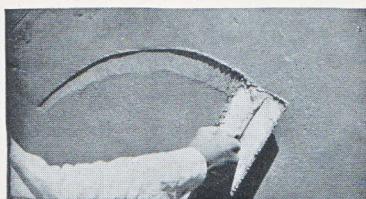
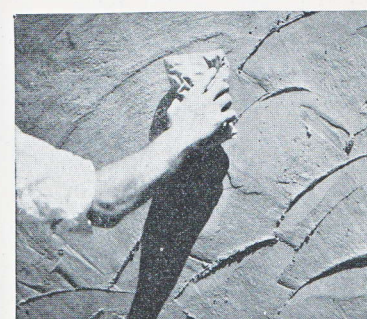
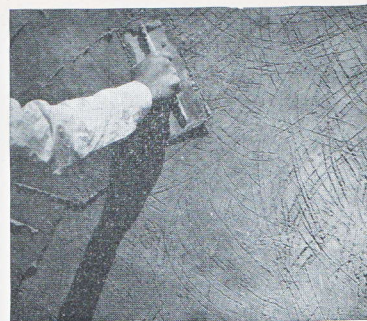
Bloodgood Tuttle, Architect



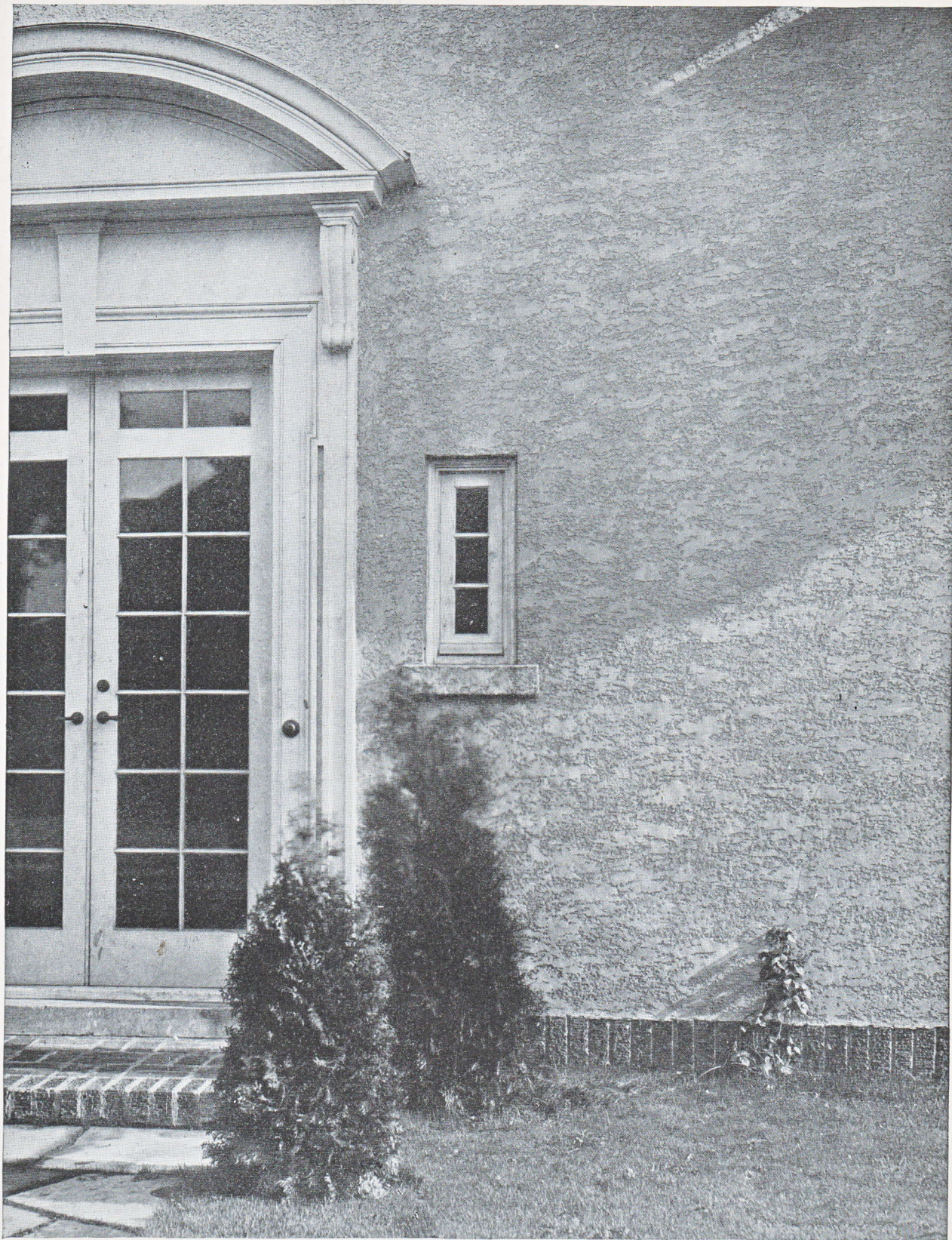
TEXTURE NO. 4

THIS finish shows the broad sweep of the trowel. In this finish the motion is more horizontal, in broad sweeping strokes from the shoulder, and not the elbow. The material working past the end of the trowel leaves slight ridges. The trowel is lifted at the end of the stroke. It is held at such an angle to the wall as to leave a smooth surface.

The finish is most attractive when subdued by rubbing with a burlap bag when partially set.



How NOT to get this finish



JAMESTOWN, N. Y.

A. J. Bodker, Architect

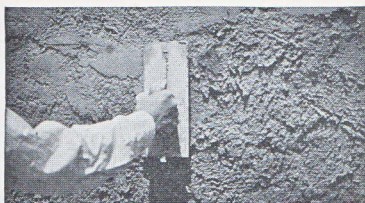
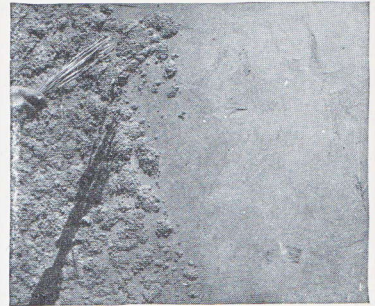


TEXTURE NO. 5

THIS texture, giving the effect of travertine, or of a stucco eroded by time, is one of many variations.

Over a thin cover coat of the finish coat mix, a spatter dash is applied. Be sure the base is thoroughly wet down. Then while the dash is still soft it is lightly troweled with the trowel held almost flat.

An attractive "polychrome" effect may be obtained by applying a thin layer of the finish coat in one color and then the spatter dash in one or more colors.

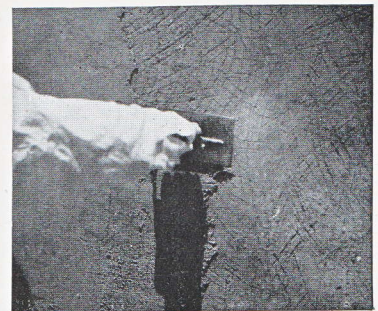
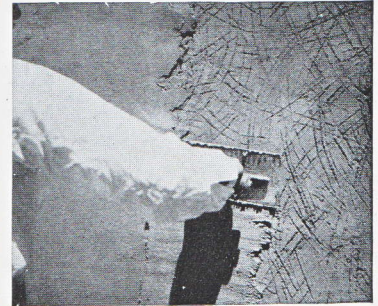
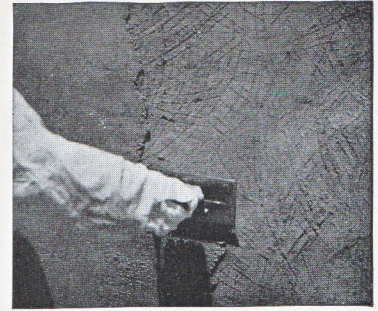


Troweling finish shown on Page 17 gives a similar effect.



RIVERDALE, N. Y.

Julius Gregory, *Architect*



TEXTURE NO. 6

THE stipple is one of the oldest of finishes and because of its fine texture is often used where the detail of the molding and trim does not allow for a heavier texture. The stipple, however, is apt to be monotonous.

This finish has about the same scale as the stipple but is never monotonous. The wall is thoroughly wet down and the finish coat applied about $\frac{3}{8}$ -inch thick and troweled fairly smooth. Then, with the trowel held almost at right angles to the wall, a quick, vertical stroke is given that tears the surface, giving it a rough, sandy effect.



Julius Gregory, *Architect*

Stucco torn with edge of trowel as applied.



Richard Dean, *Architect*

An irregular troweled surface.



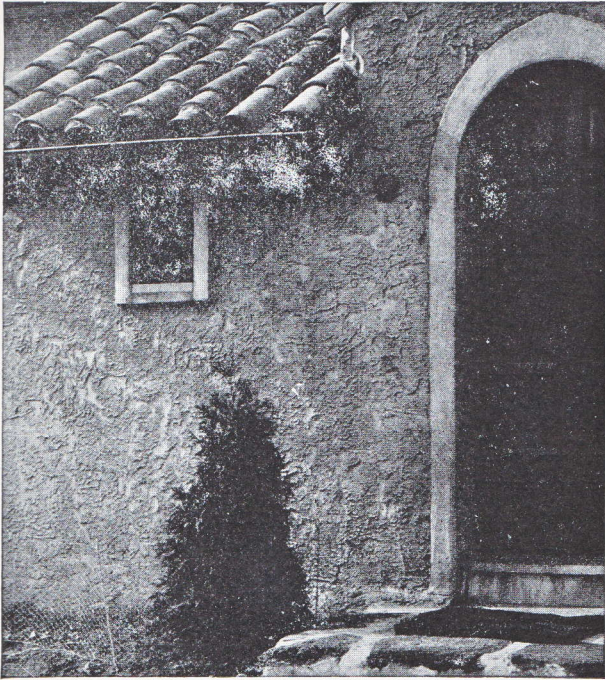
Regan E. Weller, *Architect*

Here a rough torn texture has been lightly gone over with the flat of the trowel while still soft.



Albert M. Bedell, *Architect*

A rough irregular surface partially smoothed with a bag or carpet float.



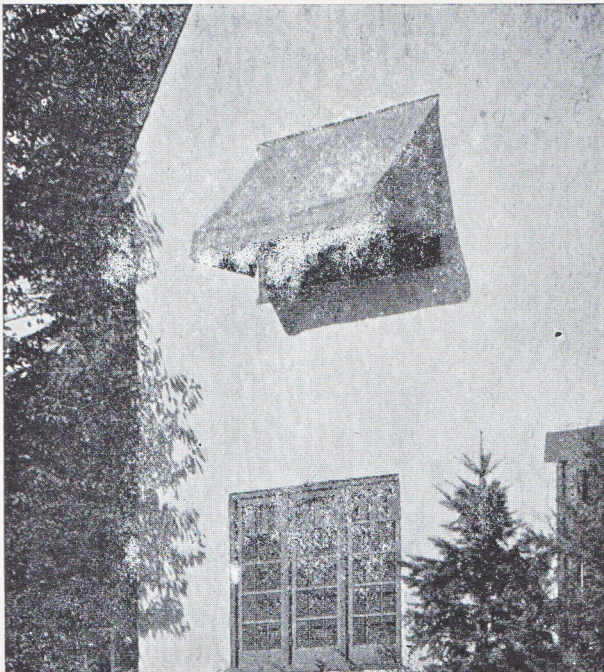
Patterson & Willcox, Inc., *Architects*

A torn finish with some parts showing smooth.



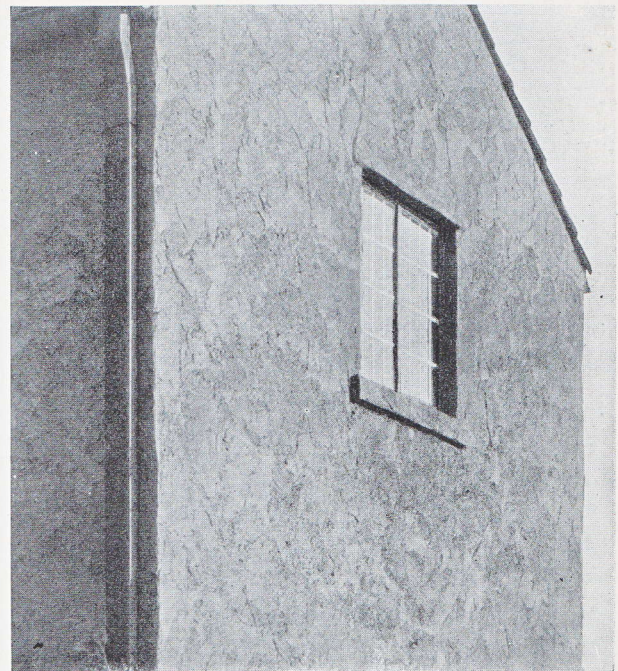
F. Albert Hunt, *Architect*

A random torn texture.



F. A. Guttenberg, *Architect*

A spatter dash finish but so applied and so troweled as to give the effect of vertical lines.



C. J. Schwieterman, *Architect*

A more massive treatment giving an effect of strength to the wall.

INTERIOR PLASTERING WITH ATLAS-WHITE PORTLAND CEMENT MORTAR

The use of Portland cement mortar is far from being limited to exterior surfaces. Such mortar is becoming more widely used for interior walls with the growing desire for texturally treated surfaces for interior finish.

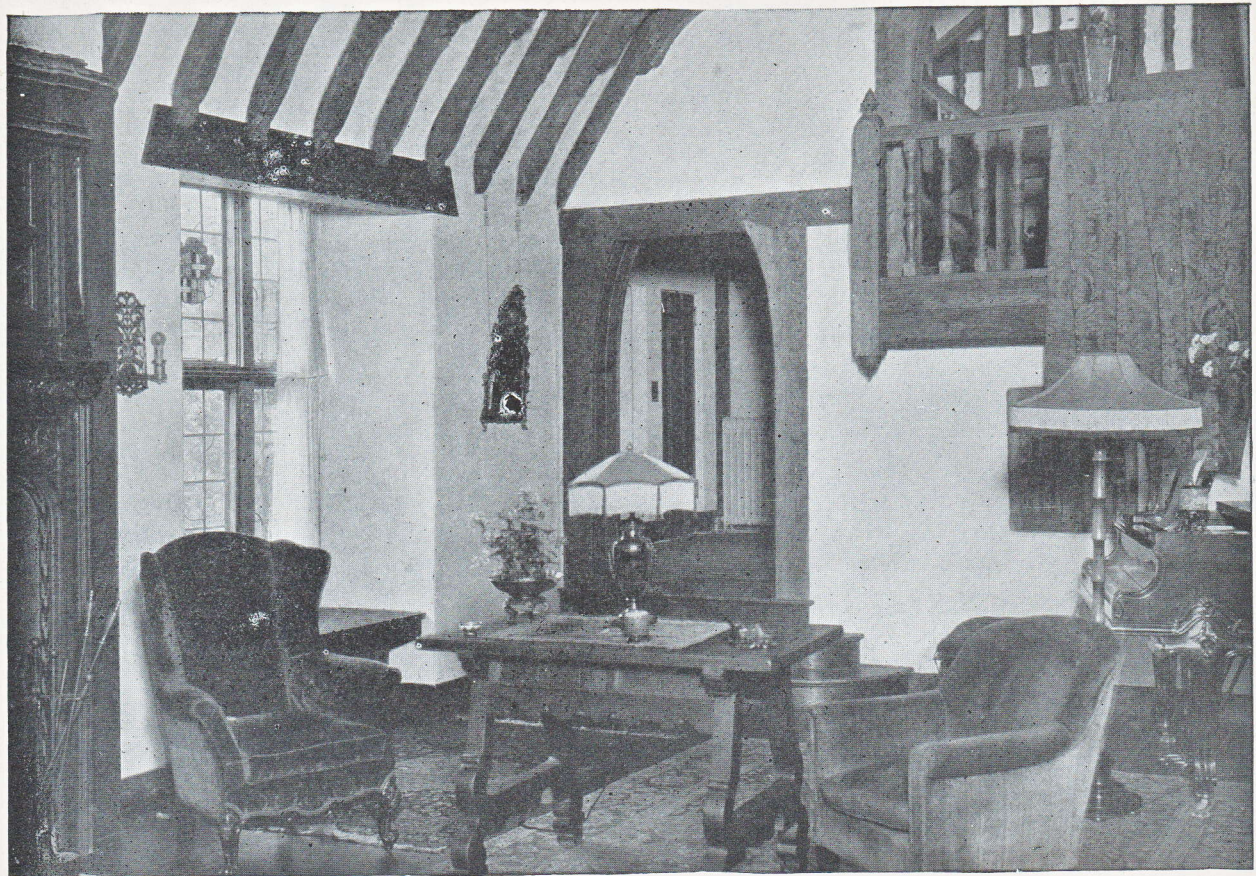
For this purpose, Portland cement mortar gives a far greater strength than lime or gypsum plaster, thus insuring the texture against damage to a far greater degree. The great strength of the Portland cement mortar prevents the knocking off of the small projections of the textured surface. The scale of the Portland cement mortar is good for this type of work, introducing sufficient sand particles to give an interesting surface.

The color effects are secured in exactly the same way as for exterior work, that is, by using Atlas White Portland Cement in the finish coat. In fact, interior plastering is identical with exterior stucco except that the textures for interior use are on a smaller scale in order to be in keeping with the size and architectural treatment of the rooms.

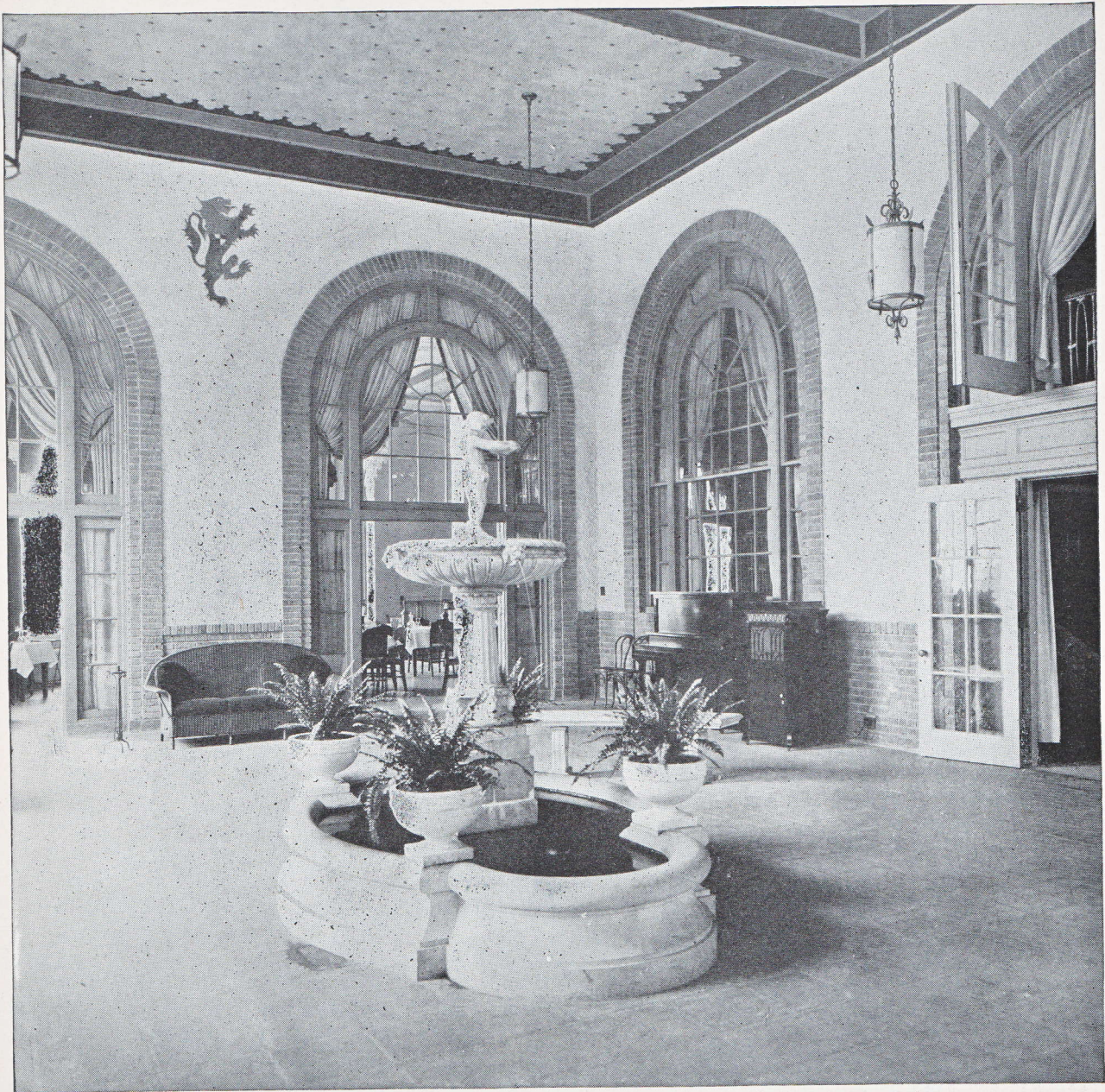
Portland cement mortar for interior work should always be on metal lath or masonry as in the case of exterior work and three coats should be used, the first two mixed with ordinary gray Portland cement and the finish coat with white Portland cement.

Portland cement mortar must not be mixed with lime or gypsum plaster. Portland cement mortar must not be applied over a base of lime or gypsum plaster for the result will be unsatisfactory and the Portland cement mortar will come off. The regular stucco mixtures should be employed for all three coats.

While the cost of Portland cement mortar interior finishes is somewhat higher than for lime or gypsum plaster, its advantages more than compensate for this. Portland cement mortar is not affected by water or moisture. A leak from roof or water pipes will not cause damage. Its great hardness and durability prevent damage from hard usage.

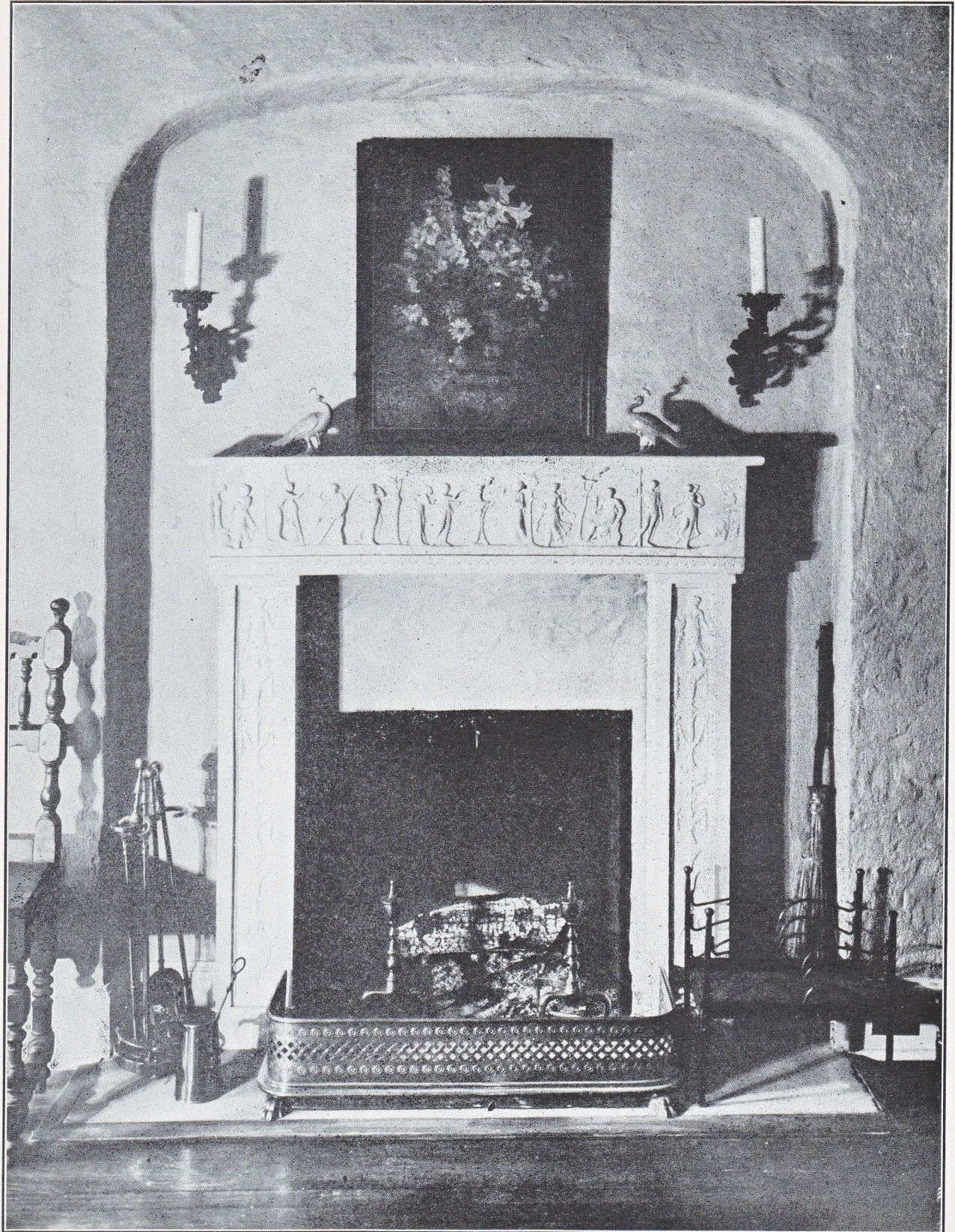


F. Albert Hunt, Architect



Fountain Room, New Bethlehem Hotel, Bethlehem, Pa.
Atlas White Stippled Finish

Ritter & Shay, Architects



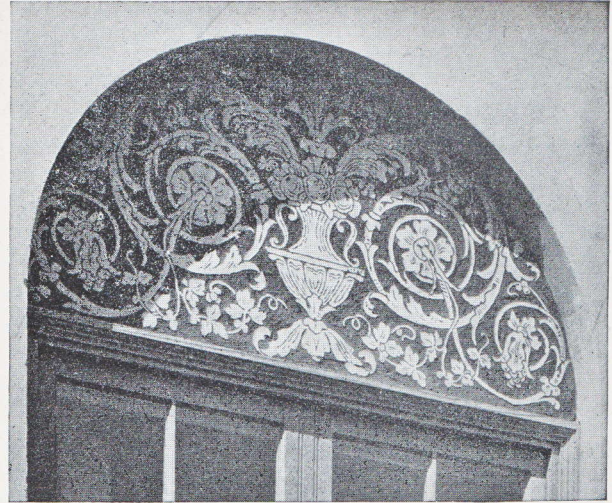
Albert M. Bedell, *Architect*

GRAFFITO

While the use of graffito is somewhat limited, it often forms an attractive means of decoration, particularly in conjunction with stucco. When done in Portland cement it can be safely used on the exterior of buildings, even in the coldest climates.

Graffito consists of applying thin layers of mortar of different colors and then removing certain parts of the overlying mortar down to the color desired to give different patterns. The effect is of bas-relief done in color.

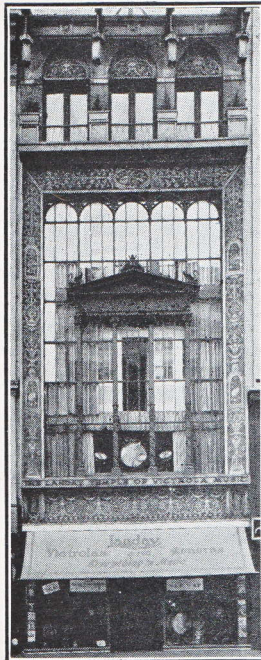
The true color values made possible by the use of different colored mortars based on Atlas White Portland Cement give most attractive effects. It is a type of decorative work which rests largely on the craftsman for the beauty of the result, particularly if the work is free hand. But by the use of stencils the work can be much simplified.



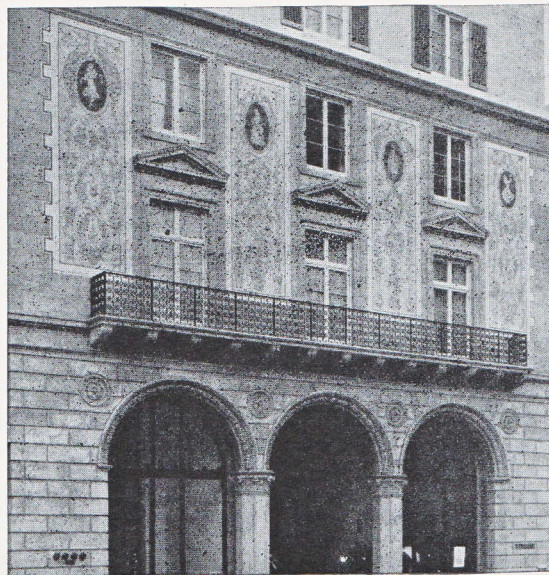
Dean & Company, Architects



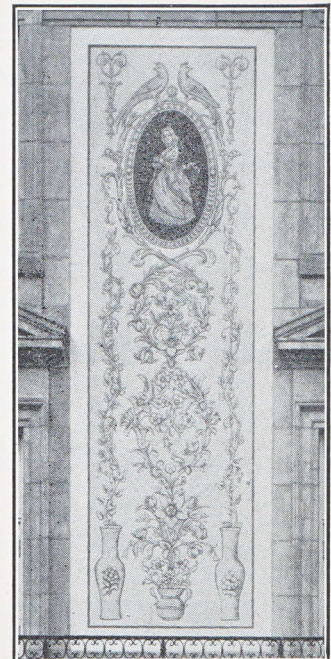
Frank E. Hahn, Architect



Simeon B. Eisendrath,
Architect



Allison and Allison,
Architects



Recommended Specifications for Portland Cement Stucco

Based on the Recommended Practice for Portland Cement Stucco issued by the American Concrete Institute's Committee on Treatment of Concrete Surfaces.

SPECIFICATION No. 1 STUCCO ON MASONRY

Concrete - Concrete Block and Brick - Hollow Clay Tile - Clay Brick - Stone

1. Scope.—The work required under this specification comprises the stuccoing of all surfaces as shown on the plans or hereinafter described.

2. Preparation of Surfaces.—All surfaces shall be clean and free from dust.

Poured concrete shall have the entire surface removed to a depth of at least $\frac{1}{8}$ " to remove all laitance.

3. Mortar.—All mortar shall consist of a mixture in the proportions of one bag Atlas Portland Cement, not less than 3 cubic feet (3 bags) sand and 5 pounds dry hydrated lime and clean water. For the finish coat Atlas White Portland Cement shall be used in the same proportions. The sand shall be clean, free of organic matter, well graded and passed through a No. 8 screen.

The finish coat shall be of a color approved by the architect and secured by using a sand of the proper color or by the use of an approved coloring pigment of which not more than 10 pounds shall be used to each bag of cement.

Mortar shall preferably be mixed by machine for at least five minutes. If mixed by hand it must be mixed until entirely uniform in color and consistency.

No mortar shall be retempered nor used later than 30 minutes after mixing.

4. Application.—All wall surfaces and each succeeding coat shall be thoroughly moistened to prevent excessive absorption from the coat of mortar being applied. The first two coats shall be thoroughly scratched. The base coats shall average from $\frac{1}{4}$ " to $\frac{3}{8}$ " thick, so that all three coats shall have a total thickness of not less than $\frac{7}{8}$ " from the masonry surface.

The second coat can be applied within 24 hours of the base coat.

The finish coat must not be applied until at least 7 days after the second coat is applied and must be kept wet for at least four days after application.

No mortar shall be applied in freezing weather or allowed to freeze.

No stucco finish will be accepted in which cracks, pits, streaks, discolorations or other defects may occur.

5. Samples.—Samples of the finish coat shall be laid up well in advance of the work and the approved sample shall be preserved during the prosecution of the work and used as a standard.

SPECIFICATION No. 2

STUCCO BACK-PLASTERED OR WITHOUT SHEATHING

1. Scope.—The work required under this specification comprises the stuccoing of all surfaces as shown on the plans or hereinafter described.

2. Mortar.—All mortar shall consist of a mixture in the proportions of one bag Atlas Portland cement, not less than 3 cubic feet (3 bags) sand and 5 pounds dry hydrated lime and clean water. For the finish coat Atlas White Portland Cement shall be used in the same proportions. The sand shall be clean, free of organic matter, well graded and passed through a No. 8 screen.

The finish coat shall be of a color approved by the architect and secured by using a sand of the proper color or by the use of an approved coloring pigment of which not more than 10 pounds shall be used to each bag of cement.

Mortar shall preferably be mixed by machine for at least five minutes. If mixed by hand it must be

mixed until entirely uniform in color and consistency. No mortar shall be retempered nor used later than 30 minutes after mixing. Hair or fibre can be used in the base coat only.

3. Lath.—Lath shall be expanded metal, weighing not less than 3.4 pounds per square yard, painted or galvanized after expansion, or woven wire cloth not lighter than 19 gauge wire, $2\frac{1}{2}$ meshes to the inch with stiffeners on 8" centers, galvanized or painted after weaving. Unless the lath is self furring, it shall be applied over furring strips of either galvanized or painted metal, not less than $\frac{3}{8}$ " thick, fastened directly to the studding using $1\frac{1}{4}$ inch, 14 gauge galvanized or painted staples, placed 12 inches apart. Furring nails may be substituted for furring strips.

The lath shall be placed horizontally and fastened over furring by $1\frac{1}{4}$ ", 14 gauge galvanized or painted staples not more than 8" apart.

Vertical laps shall occur over furring strips and fastened with the same kind of staples not more than 4" apart. Horizontal joints shall be lapped or butted and laced with 18 gauge galvanized wire so that adjoining sheets act as one uniform sheet.

At the corners of the building the furring strips shall be at least six inches from the corner and lath shall be bent around the corner.

4. Application.—The stucco shall be applied in three coats on the outside of the lath and back-plastered one coat, the whole finishing $1\frac{1}{2}$ " thick with the outside face about $1\frac{1}{4}$ inches beyond the face of the studs.

Each coat shall be thoroughly moistened to prevent excessive absorption from the coat of mortar

being applied. The first two coats shall be thoroughly cross scratched after partially setting.

The back-plastered coat shall be applied as soon as the base coat has set sufficiently.

The second coat can be applied within 24 hours of the base coat.

The finish coat must not be applied until at least seven days after the second coat. The finish coat must be kept wet for at least four days after application.

No mortar shall be applied in freezing weather or allowed to freeze.

5. Samples.—Samples of the finish coat shall be laid up well in advance of the work and the approved sample shall be preserved during the prosecution of the work and used as a standard.

SPECIFICATION No. 3 STUCCO ON METAL LATH OVER SHEATHING

1. Scope.—The work required under this specification comprises the stuccoing of all surfaces as shown on the plans or hereinafter described.

2. Mortar.—All mortar shall consist of a mixture in the proportions of one bag Atlas Portland Cement, not less than 3 cubic feet (3 bags) sand and 5 pounds dry hydrated lime and clean water. For the finish coat Atlas White Portland Cement shall be used in the same proportions. The sand shall be clean, free of organic matter, well graded and passed through a No. 8 screen.

The finish coat shall be of a color approved by the architect and secured by using a sand of the proper color or by the use of an approved coloring pigment of which not more than 10 pounds shall be used to each bag of cement.

Mortar shall preferably be mixed by machine for at least five minutes. If mixed by hand it must be mixed until entirely uniform in color and consistency. No mortar shall be rettempered nor used later than 30 minutes after mixing. Hair or fibre can be used in the base coat only.

3. Lath.—Lath shall be expanded metal, weighing not less than 3.4 pounds per square yard, painted or galvanized after expansion, or woven wire cloth not lighter than 19 gauge wire, $2\frac{1}{2}$ meshes to the inch with stiffeners on 8" centers, galvanized or painted after weaving. Unless the lath is self furring, it shall be applied over furring strips of either galvanized or painted metal, not less than $\frac{3}{8}$ " thick, placed over the waterproofing paper and sheathing directly over the line of the studs and fastened with $1\frac{1}{4}$ ", 14 gauge galvanized or painted staples not more than 12 inches apart. Furring nails may be substituted for furring strips.

The lath shall be placed horizontally and fastened over furring by $1\frac{1}{4}$ ", 14 gauge galvanized or painted staples not more than 8 inches apart.

Vertical laps shall occur over furring strips and fastened with the same kind of staples not more than 4 inches apart. Horizontal joints shall be lapped or butted and laced with 18 gauge galvanized wire so that adjoining sheets act as one uniform sheet.

At the corners of the building the furring strips shall be at least six inches from the corner and lath shall be bent around the corner.

4. Application.—Each coat shall be thoroughly moistened to prevent excessive absorption from the coat of mortar being applied. The first two coats shall be thoroughly cross scratched, after partially setting. The base coats shall average from $\frac{1}{4}$ " to $\frac{3}{8}$ " thick, so that all three coats shall have a total thickness of not less than one inch from the face of the furring strips. The base coat shall be applied with sufficient pressure so that it thoroughly imbeds the lath.

The second coat can be applied within 24 hours of the base coat.

The finish coat must not be applied until at least seven days after the second coat. The finish coat must be kept wet for at least four days after application.

No mortar shall be applied in freezing weather or allowed to freeze.

5. Samples.—Samples of the finish coat shall be laid up well in advance of the work and the approved sample shall be preserved during the prosecution of the work and used as a standard.

ATLAS WHITE PORTLAND CEMENT

"Pure WHITE and with all the strength of gray Portland cement."

We are manufacturers of Portland cement of two colors, gray and white. Both of these conform in every way with the Standard Specifications for Portland Cement of the American Society for Testing Materials and adopted by the U. S. Government, the American Institute of Architects, American Society of Civil Engineers and similar bodies.

Because of the pure white color of white Atlas Portland Cement it is used wherever the gray Atlas Portland cement does not give the desired color effect.

Atlas White Portland Cement can be used for any work for which gray Portland cement is suitable, because it gives equal strength, equal wear and equal durability.

The use of white Atlas Portland Cement results in a mortar which will not stain fine textured stone such as Indiana Limestone, marble and similar stones which might be stained by mortar made with gray Portland cement.

Among the established uses of Atlas White Portland Cement are:—

For its color

Stucco—Makes possible a great variety of shades and tints because of neutrality of color. It is colored by mixing directly with a sand of the proper color or by pigments.

Brick, Terra Cotta or Tile Joints—Gives either a pure white mortar to contrast with the color of the material or a tinted joint to blend with the tonal value of the brick or terra cotta. It is colored by mixing directly with a sand of the proper color or by pigments.

Cast Stone, Trim and Garden Furniture—Gives white or colored effects where gray cement color would be dead and uninteresting.

Terrazzo—Makes possible an entirely new and attractive range of color effects. Will not soil and

has the same wearing qualities as gray Portland Cement.

Swimming Pools—Used either with white sand or sometimes tinted as a plaster for lining swimming pools. Also used to pour the exterior walls to give a white effect directly.

Interior Plastering—For interior plastering it gives all the range of colors and with textured walls, the strength necessary to give good wearing quality.

It is unaffected by moisture and therefore also used for dairies, cold storage rooms and laboratories.

For its non-staining qualities

Pointing, Setting and Backing Limestone. Widely used for setting Indiana Limestone, marble and similar stone. Gives the strongest possible non-staining mortar.

Strength, Physical and Chemical Properties of Atlas White Portland Cement in comparison with the Standard Specifications for Portland Cement (which include White).

1 Part Cement and 3 Parts Sand, Tensile Strength per Square Inch.	Standard Specifications	Atlas White Portland Cement.
At 7 days.....	200 Lbs.	331 Lbs.
Ditto at 28 days.....	300 Lbs.	467 Lbs.
Loss on Ignition.....	Not to exceed 4.00%	2.13%
Sulphuric Anhydride.....	" " " 2.00%	1.83%
Magnesia.....	" " " 5.00%	1.19%
Fineness—Residue on No. 200 sieve.....	" " " 22.00%	6.9%
Initial set.....	Not less than 45 to 60 minutes	2 hr. 30 min.
Final set.....	Within 10 hours	5 hr. 00 min.

THE ATLAS PORTLAND CEMENT COMPANY

25 BROADWAY, NEW YORK

ST. LOUIS - BIRMINGHAM - KANSAS CITY, MO. - CHICAGO - PHILADELPHIA
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